



Electrical Power and Machines Engineering Department

Tanta University



Faculty of Engineering

ELECTRICAL POWER SYSTEM (1)

EXPERIMENTS

FOR 2ND YEAR STUDENT

2017

Eng. Eman Gaber

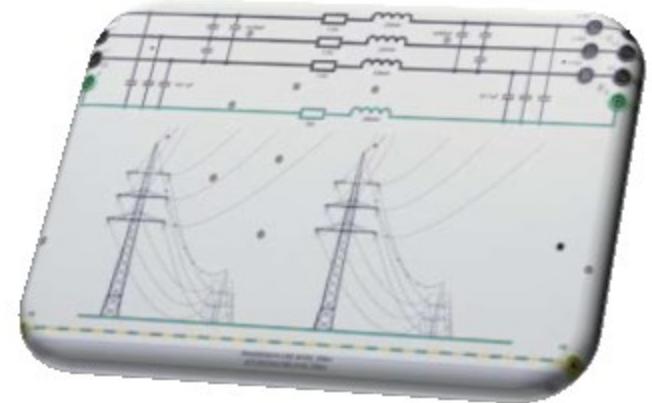
Eng. Mohamed Elkadeem

Eng. Mahmoud Elkazaz

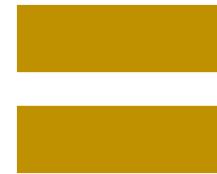
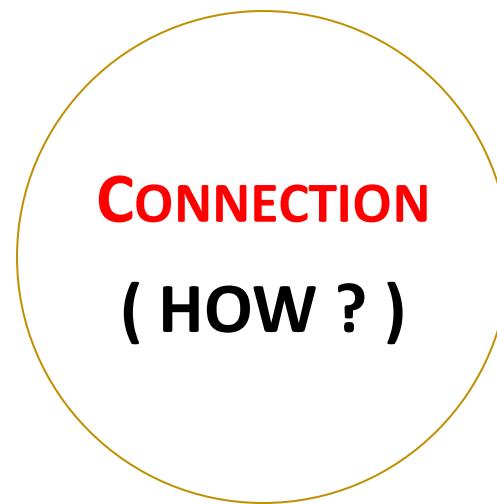
Eng. Abd El-Aziz Gebril

CONTENTS

1. Performance of short transmission lines
2. Determination of short transmission line model constants
- 3. Performance of Medium Transmission Lines (π -Model)**
4. Performance of Medium Transmission Lines (T-Model)
5. Determination of the Dc Distributor Performance
6. Potential Distribution Over a String of Suspension Insulators



OUTLINES



Performance of Medium Transmission Lines (π -Model)

80 km < L < 250 km + Up to 100 kV

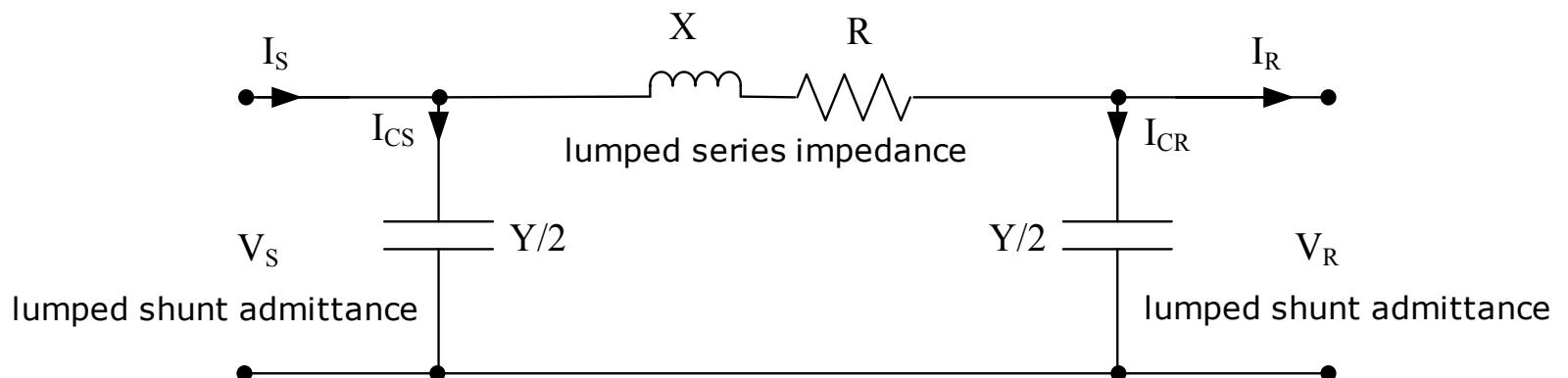
OBJECTIVES

TL resistance (R_{av}), reactance (X_{av})
and admittance (Y_{av})

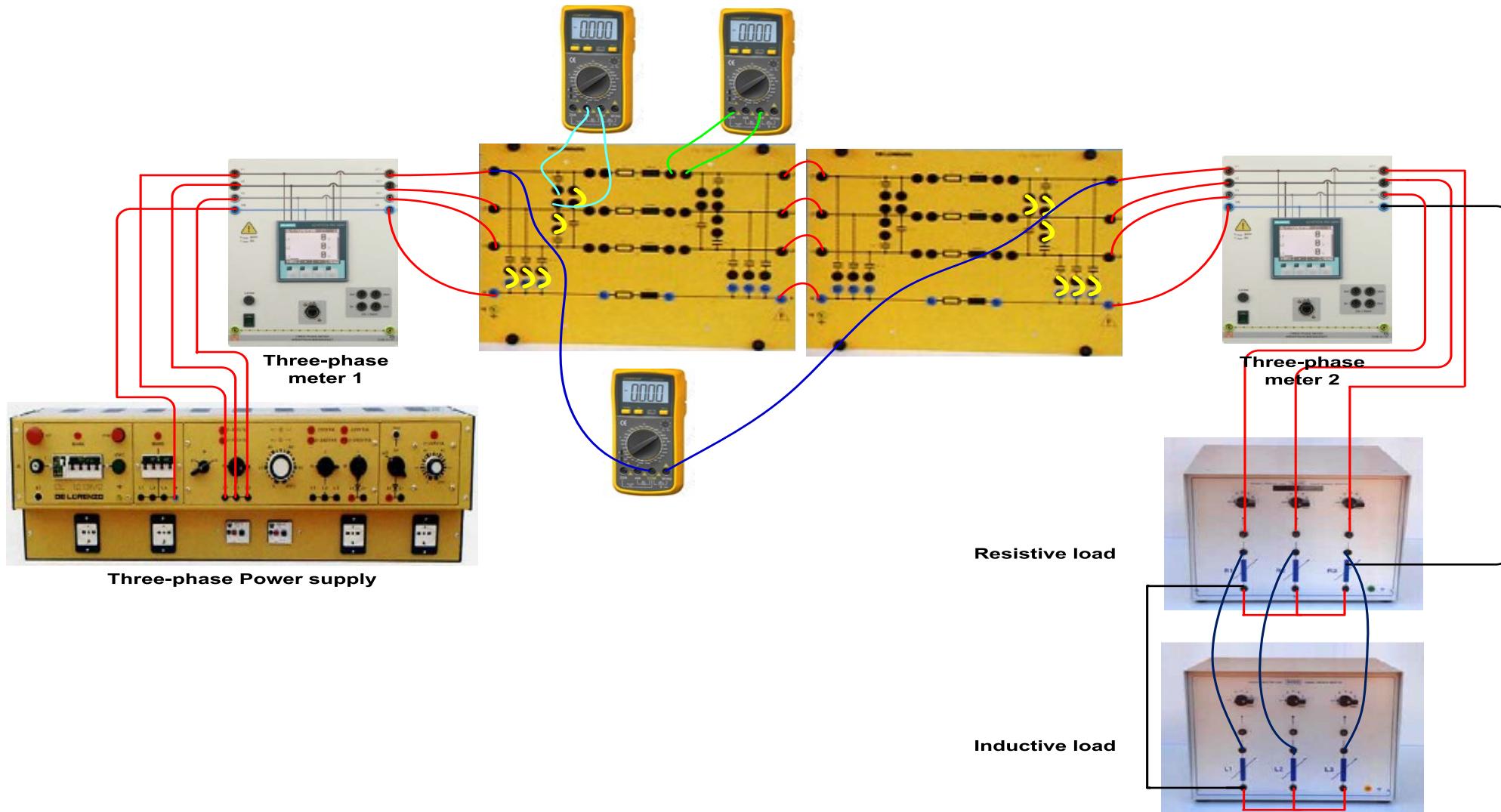
C/Cs of the medium TL

Plot the phasor diagram at lag, unity, and lead power factors

Medium TL
(from 80 up to 250 km)



CONNECTION DIAGRAM



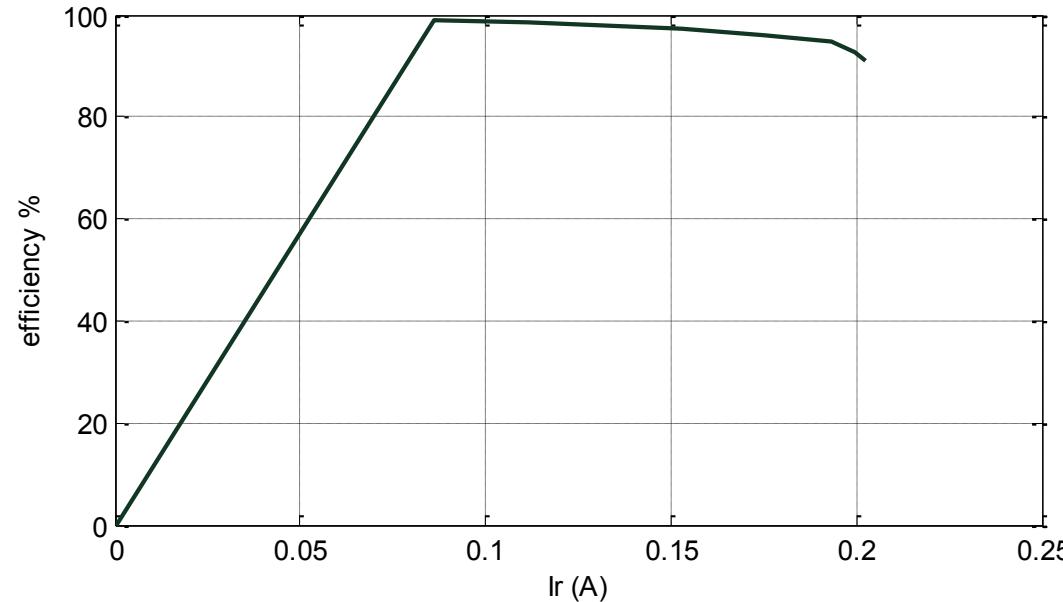
RESULTS

R	V_s	I_r	V_r	P_r	P_s	I_c	I_L	ΔV	ζ%	ε%	R	Z	Y	X_L
∞	✓	✓	✓	✓	✓	✓	✓	✓						
1														
2														
3														
4														
5														

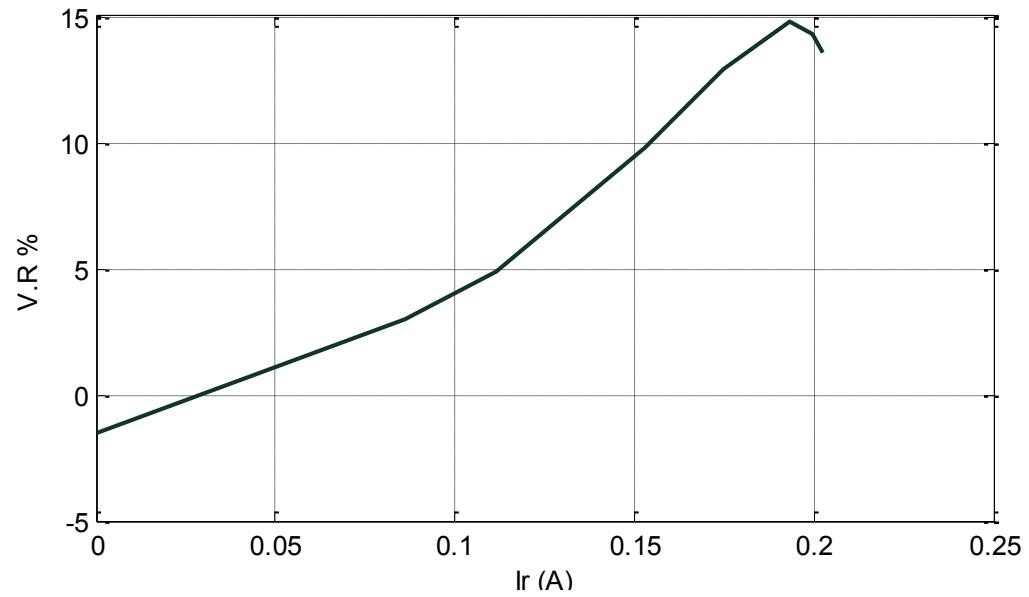


R_{av}, X_{av} & Y_{av}

RESULTS

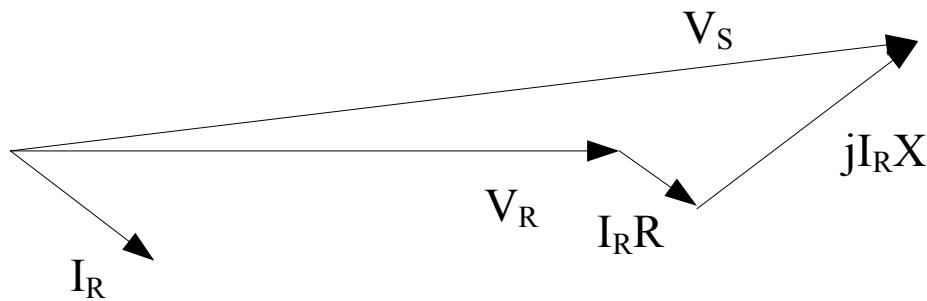


Efficiency % and load current (π -model)

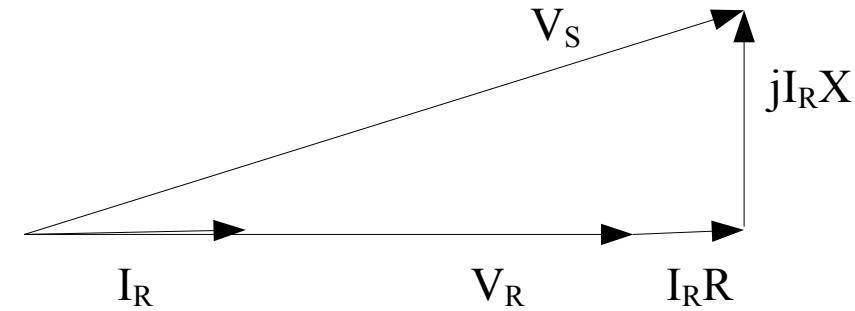


Voltage regulation % and load current (π -model)

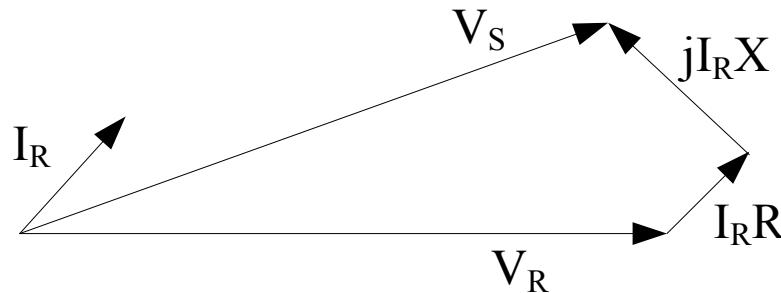
RESULTS



Phasor diagram with **Lagging PF**



Unity PF



Leading PF

QUESTIONS

1. Plot the phasor diagram at one recording data.
2. Calculate average TL resistance, inductance and capacitance.
3. Repeat these steps at unity power factor.
4. Repeat these steps at lead power factor.
5. Draw the efficiency and voltage regulation against IR for lag, lead and unity power factor on one figure.
6. Write your comment for all results.

DISCUSSION

1. What is the effect of load power factor on voltage regulation and efficiency of medium transmission lines?
2. A medium transmission line is open circuited at the receiving end. Will the receiving end voltage is higher than the sending end voltage? Explain your answer.

RESULTS

WHAT DO THE MEASUREMENT RESULTS INDICATE ? !

Comments !!



EXP.3 RESULTS

R	V _s v	I _r mA	I _s mA	V _r v	P _s w	P _r w	I _c mA	I _L mA	ΔV v	pf _s	pf _r
1	99	170	90	80	23	8	31	125	23	0.99	0.55
2	105	230	150	80	42	47	33	195	36	0.94	0.78
3	113	290	220	80	60	69	36	270	50	0.92	0.87
4	124	360	290	80	80	95	39	345	64	0.87	0.92
5	134	440	360	80	100	122	42	430	79	0.83	0.95

THANKS